WHAT IS CLAIMED IS:

1. A method for investigating an image set of geophysical data distributed over a first N-dimensional volume where $N \geq 2$, the method comprising:

selecting a subvolume of a target set of geophysical data distributed over a second N-dimensional volume, the subvolume enclosing a known feature of interest; and

at each of a plurality of positions within the first N-dimensional volume, calculating a cross-correlation between the data distributed within the subvolume and corresponding data distributed in the first N-dimensional volume about the each of the plurality of positions.

2. The method recited in claim 1 further comprising displaying for a user a distribution of results of calculating the cross-correlation throughout the first N-dimensional volume.

3. The method recited in claim 1 further comprising:

modifying the subvolume in accordance with a user instruction; and

at each of a plurality of positions within the first N-dimensional volume, calculating a cross-correlation between the data distributed within the modified subvolume and corresponding data distributed in the first N-dimensional volume about the each of the plurality of positions.

4. The method recited in claim 3 wherein modifying the subvolume comprises changing a size of the subvolume.

5. The method recited in claim 3 wherein modifying the subvolume comprises changing a shape of the subvolume.

6. The method recited in claim 1 wherein:

each of the image set and the target set consists of real data, the method further comprising respectively transforming the real data of the image and target sets to complex data by performing a Hilbert transform of the real data; and

calculating the cross-correlation comprises calculating a complex cross-correlation between the transformed data distributed within the subvolume and corresponding transformed data distributed in the first N-dimensional volume about the each of the plurality of positions.

7. The method recited in claim 6 further comprising calculating an amplitude envelope and phase distribution from the complex cross-correlation over the first N-dimensional volume.

8. The method recited in claim 1 wherein:

each of the image set and the target set consists of real data; and

calculating the cross-correlation comprises calculating a real cross-correlation.

9. The method recited in claim 1 further comprising normalizing the data distributed within the subvolume over the subvolume prior to calculating the cross-correlation.

10. The method recited in claim 1 wherein $N = 3$.

11. The method recited in claim 1 wherein $N = 4$.

12. The method recited in claim 1 wherein the image and target sets comprise seismic data.

13. The method recited in claim 1 wherein the image and target sets comprise mathematical transforms of seismic data.

14. The method recited in claim 1 wherein the image and target sets comprise prestack data.

15. The method recited in claim 1 wherein the image set is the target set.

16. The method recited in claim 1 wherein the subvolume is a parallelepiped.

17. A method for investigating an image set of real geophysical data distributed over a first N-dimensional volume where $N \geq 2$ according to a known feature of interest identified in a target set of real geophysical data distributed over a second N-dimensional volume, the method comprising:

transforming the real geophysical data of the first N-dimensional volume to complex data by performing a Hilbert transform on the real geophysical data of the first N-dimensional volume;

transforming the real geophysical data of the second N-dimensional volume to complex data by performing a Hilbert transform on the real geophysical data of the second N-dimensional volume;

selecting a subvolume of the target set that encloses the known feature of interest in accordance with a user instruction; and

at each of a plurality of positions within the first N-dimensional volume, calculating a complex cross-correlation between the transformed data within the subvolume and corresponding transformed data distributed in the first N-dimensional volume about the each of the plurality of positions.

18. The method recited in claim 17 further comprising:

modifying the subvolume in accordance with another user instruction; and

at each of a plurality of positions within the first N-dimensional volume, calculating a complex cross-correlation between the transformed data within the modified subvolume and corresponding transformed data distributed in the first N-dimensional volume about the each of the plurality of positions.

19. The method recited in claim 17 further comprising normalizing the transformed data distributed within the subvolume over the subvolume prior to calculating the complex cross-correlation.

20. The method recited in claim 17 wherein the image set is the target set.

21. A computer-readable storage medium having a computer-readable program embodied therein for directing operation of a computer system including an input device, a processor, and a display device, wherein the computer-readable program includes instructions for operating the computer system for investigating geophysical data in accordance with the following:

receiving, with the input device, an image set of geophysical data distributed over a first N-dimensional volume where $N \geq 2$;

receiving, with the input device, a target set of geophysical data distributed over a second N-dimensional volume;

receiving, with the input device, a first user instruction identifying a subvolume of the target set that encloses a known feature of interest; and

calculating, with the processor at each of a plurality of positions within the first *N*-dimensional volume, a cross-correlation between the data distributed within the subvolume and corresponding data distributed in the first *N*-dimensional volume about the each of the plurality of positions.

22. The computer-readable storage medium recited in claim 21 wherein the computer-readably program further includes instructions for displaying, for a user with the display device, a distribution of results of calculating the cross-correlation throughout the first *N*-dimensional volume.

23. The computer-readable storage medium recited in claim 21 wherein the computer-readable program further includes:

instructions for receiving, with the input device, a second user instruction to modify the subvolume; and

instructions for calculating, with the processor at each of a plurality of positions within the first *N*-dimensional volume, a cross-correlation between the data distributed within the modified subvolume and corresponding data distributed in the first *N*-dimensional volume about the each of the plurality of positions.

24. The computer-readable storage medium recited in claim 21 wherein:

each of the image set and the target set consists of real data, the computer-readable program further including instructions for respectively transforming the real data of the image and target sets to complex data by performing a Hilbert transform of the real data; and

the instructions for calculating the cross-correlation comprise instructions for calculating a complex cross-correlation between the transformed data distributed within the subvolume and corresponding transformed data distributed in the first *N*-dimensional volume about the each of the plurality of positions.

25. The computer-readable storage medium recited in claim 24 wherein the computer-readable program further includes instructions for calculating an amplitude envelope and phase distribution from the complex cross-correlation over the first *N*-dimensional volume.

26. The computer-readable storage medium recited in claim 21 wherein the computer-readable program further includes instructions for normalizing, with the processor, the data distributed within the subvolume prior to calculating the cross-correlation.